PATENT ABSTRACTS OF JAPAN

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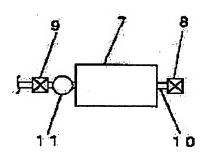
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(54) FUEL CELL POWER GENERATING SYSTEM

(57) Abstract:

PURPOSE: To confirm fuel leak by supplying fuel from a fuel path with an end stop valve arranged downstream of a fuel cell closed and informing the pressure value of the fuel in the fuel cell when a main stop valve is closed. CONSTITUTION: An end stop valve 8 arranged downstream of a fuel cell 7 and a main stop valve 9 arranged upstream are connected through a fuel path 10, and a pressure informing device 11 is set in the fuel path 10. When fuel gas is supplied from a fuel supply source with the end stop valve 8 closed and the main stop valve 9 opened, the fuel gas becomes full in the fuel cell 7 and the fuel path 10. When the main stop valve 9 is closed, the fuel gas is sealed in the fuel cell 7 and the fuel path 10, and the sealed gas pressure is detected



with the pressure informing device 11. When the fuel gas does not leak from the fuel cell 7, the sealed gas pressure is kept constant, but when the fuel gas leaks, the sealed gas pressure gradually lowers with time elapsed.

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CLAIMS

[Claim(s)]

[Claim 1] The fuel cell generation-of-electrical-energy system equipped with the fuel cell, the former stop valve prepared in the upper section of said fuel cell, the point stop valve prepared in the downstream of said fuel cell, and a pressure information means to detect and report the pressure in the condition that said both valves closed.

[Claim 2] The fuel cell generation-of-electrical-energy system according to claim 1 which equipped the entrance side of a former stop valve with the inert gas source of supply which supplies inert gas. [Claim 3] The fuel cell generation-of-electrical-energy system [equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve] according to claim 1.

[Claim 4] The fuel cell generation-of-electrical-energy system [equipped with a radio means to transmit the pressure information acquired with the pressure information means] according to claim 1. [Claim 5] The fuel cell generation-of-electrical-energy system [equipped with a timer means to operate

[Claim 5] The fuel cell generation-of-electrical-energy system [equipped with a timer means to operate a radio means with a predetermined time interval] according to claim 4.

[Claim 6] The fuel cell generation-of-electrical-energy system [equipped with a display means to display indoors the pressure information transmitted by the radio means] according to claim 4. [Claim 7] The fuel cell generation-of-electrical-energy system [equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means] according to claim 4.

[Claim 8] The fuel cell generation-of-electrical-energy system [equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means] according to claim 7.

[Claim 9] The fuel cell generation-of-electrical-energy system according to claim 7 which it had the operation means which carries out data processing of the time series data of the pressure information accumulated in a storage means, a judgment means judge the abnormalities of a fuel in leakage based on the pressure value and the reference value which were acquired with said operation means, and an information means it is based on the result of said judgment means, and display and notify the condition at the time of the need, and said operation means, said judgment means, and said information means were really constituted, and was installed indoors.

[Claim 10] The fuel cell generation-of-electrical-energy system [equipped with the terminal circuit means connected to the external public line] according to claim 9 by which the information means was connected with said terminal circuit means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention detects leakage of the fuel from a fuel cell before a start up, and relates to the fuel cell generation-of-electrical-energy system which aimed at improvement in safety. [0002]

[Description of the Prior Art] Conventionally, there was a thing of the configuration of JP,4-220955,A shown in drawing 4 as this kind of a fuel cell. As shown in drawing, the body 1 of a fuel cell is contained by the container 2, the inert gas supply line by which 3 supplies inert gas, such as nitrogen gas, from an end in a container 2, and 4 are covers which surround the body 1 of a fuel cell, free passage connection of the upper part is made in inert gas emission Rhine 5, and the gas concentration detector 6 is formed. Fuel gas, such as hydrogen revealed in the container 2 from the interior of the body 1 of a fuel cell, is covered, and a collection is carried out by 4, and it is detected in the gas concentration detector 6.

T00031

[Problem(s) to be Solved by the Invention] However, the equipment for make always full inert gas, such as the container 2 which surround the body 1 of a fuel cell, and nitrogen, be required, when the whole system be generated in a miniaturization by the defect of **** and the gas concentration detection 7, or the gas leakage below detection precision, inflammable gas be filled with the above-mentioned conventional configuration in the container 2, and with it, the technical problem that it resulted in a very dangerous condition occurred.

[0004] This invention solves the above-mentioned conventional technical problem, and it is small and aims at the thing which can moreover supervise leakage of a fuel daily and for which a reliable fuel cell generation-of-electrical-energy system is offered beforehand which starts a generating mode.

[0005]

[Means for Solving the Problem] This invention consists of the following configurations, in order to solve the above-mentioned technical problem. That is, it is considering as the configuration equipped with the fuel cell, the former stop valve prepared in the upper section of said fuel cell, the point stop valve prepared in the downstream of said fuel cell, and a pressure information means to detect and report the pressure in the condition that said both valves closed.

[0006] Moreover, it is considering as the configuration which equipped the entrance side of a former stop valve with the inert gas source of supply which supplies inert gas as the 2nd configuration.
[0007] Moreover, it is considering as the configuration equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve as the 3rd configuration.

[0008] Moreover, it is considering as the configuration equipped with a radio means to transmit the pressure information acquired with the pressure information means as the 4th configuration.

[0009] Moreover, it is considering as the configuration equipped with a timer means to operate a radio means with a predetermined time interval, as the 5th configuration.

[0010] Moreover, it is considering as the configuration equipped with a display means to display indoors

the pressure information transmitted by the radio means as the 6th configuration.

[0011] Moreover, it is considering as the configuration equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means as the 7th configuration. [0012] Moreover, it is considering as the configuration equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means as the 8th configuration.

[0013] Moreover, the operation means which carries out data processing of the time series data of the pressure information accumulated in the storage means as the 9th configuration, A judgment means to judge the abnormalities in leakage of a fuel based on the pressure value and reference value which were acquired with said operation means, It is based on the result of said judgment means, has an information means to display and notify the condition at the time of the need, and is considering as the configuration in which said operation means, said judgment means, and said information means were really constituted, and were installed indoors.

[0014] Moreover, as the 10th configuration, it has the terminal circuit means connected to the external public line, and the information means is considering as the configuration connected with said terminal circuit means.

[0015]

[Function] The fuel cell generation-of-electrical-energy system of this invention achieves the following operations by the above-mentioned configuration. That is, if the closedown of the former stop valve prepared in the upper section of a fuel cell is carried out after the closedown of the point stop valve prepared in the downstream of a fuel cell has been carried out by the configuration equipped with a pressure information means detect and report the charged pressure in the condition that a former stop valve and a point stop valve, and both valves closed and a fuel is supplied, it will be in the condition that the fuel was enclosed in the fuel cell, and the charged-pressure value will be reported by the pressure information means. Since a pressure value falls gradually with time amount progress when the fuel is revealed from the fuel cell, leakage can be checked with a pressure information means.

[0016] Moreover, it will be in the condition that inert gas was enclosed in the fuel cell through the former stop valve by the configuration which equipped the entrance side of a former stop valve of the 2nd configuration with the inert gas source of supply which supplies inert gas, the charged pressure value is detected by the pressure information means, and leakage can be checked from a pressure drop. Also when leakage has occurred, inert gas leaks to a perimeter, and it is [no risk of ignition explosion] and is safe.

[0017] Moreover, when the pressure of the fuel enclosed with a fuel cell is more than a predetermined pressure, after a point stop valve will be in an open condition and charged pressure declines to a predetermined pressure by the configuration equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve of the 3rd configuration, since a closedown is carried out, charged pressure can be set as a predetermined pressure, and breakage of a fuel cell can be prevented. [0018] Moreover, when the pressure variation of the fuel enclosed with the fuel cell is detected by the configuration equipped with a radio means to transmit the pressure information acquired with the pressure information means of the 4th configuration, with a pressure information means and leakage occurs in a fuel cell by it, the detection pressure force declines, and the pressure information according to a leak rate is transmitted from a radio means. Therefore, leakage generating can be checked daily in the distant locations, such as indoor.

[0019] Moreover, the power consumed by the configuration equipped with a timer means to operate the radio means of the 5th configuration with a predetermined time interval in case it transmits from a radio means can be held down to necessary minimum.

[0020] Moreover, since the pressure information on the fuel enclosed with the fuel cell by the configuration equipped with a display means to display indoors the pressure information transmitted by the radio means of the 6th configuration is indoors displayed by the radio means, before an indoor user starts operation of a fuel cell, leakage of the fuel from a fuel cell can be recognized.

[0021] moreover, the pressure information on the charged pressure detected by superannuation of a fuel

cell before a start up by the configuration equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means of the 7th configuration also when leakage advances gradually -- each time -- a storage means -- accumulating -- having -- since -- leakage -- the situation of secular change is detectable.

[0022] Moreover, an indoor user can recognize the situation of secular change of the leakage from a fuel cell before initiation of a generating mode by the configuration equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means of the 8th configuration.

[0023] Moreover, the operation means which carries out data processing of the time series data of the pressure information accumulated in the storage means of the 9th configuration, A judgment means to judge the abnormalities in leakage of a fuel based on the pressure value and reference value which were acquired with said operation means, By the configuration which it was based on the result of said judgment means, and had an information means to display and notify the condition at the time of the need, and said operation means, said judgment means, and said information means were really constituted, and was installed indoors poor assembly, superannuation, etc. of a fuel cell -- the fall inclination of the charged pressure before a start up -- **, also when going on gradually Pressure information is accumulated in a storage means as time series data, before a start up -- each time -detecting -- having -- charged pressure -- A future present or leakage value is computed by the operation means, a comparison test is carried out to a reference value by the judgment means, and an indoor user can be made to recognize a leakage situation with an information means based on the result. [0024] Moreover, it can have the terminal circuit means connected to the external public line of the 10th configuration, and leakage information can be transmitted to the service firm of the exterior where the information means was connected with the terminal circuit means through the public line by the configuration connected with said terminal circuit means etc. timely. [0025]

[Example] The example of this invention is explained with reference to a drawing below. [0026] <u>Drawing 1</u> is the fuel cell generation-of-electrical-energy structure-of-a-system Fig. of the 1st example of this invention. In drawing 1, free passage connection of the former stop valve 9 prepared in the point stop valve 8 and upper **** which were prepared in the downstream of a fuel cell 7 is made in the fuel path 10, and the pressure information means 11 is formed in the fuel path 10. [0027] In the above-mentioned configuration, where the closing former stop valve 9 is opened, if fuel gas is supplied from a fuel source (not shown), fuel gas will be [stop valve / 8 / point] full of a fuel cell 7 and the fuel path 10. If the after that former stop valve 9 is closed, it will be in the condition that fuel gas was enclosed with the fuel cell 7 and the fuel path 10, and the charged pressure will be detected by the pressure information means 11. When fuel gas is not revealed from a fuel cell 7, charged pressure maintains constant value, but when fuel gas is revealed, since charged pressure declines gradually with time amount progress, leakage can be checked with the pressure information means 11. [0028] Drawing 2 is the fuel cell generation-of-electrical-energy structure-of-a-system Fig. of the 2nd example of this invention, the thing of drawing 1 and a same sign is a corresponding component, and detailed explanation is omitted. In drawing, 12 is the inert gas source of supply connected to the entrance side of the former stop valve 9, and the pressure relief valve 13 is formed in the down-stream edge of the fuel path 10.

[0029] In the above-mentioned configuration, if inert gas is supplied from the inert gas source of supply 12, a fuel cell 7 and the fuel path 10 will be filled with inert gas. If a pressure relief valve 13 is closed after that, it will be in the condition that inert gas was enclosed with the fuel cell 7 and the fuel path 10, and the charged pressure will be detected by the pressure information means 11. When inert gas is revealed, since charged pressure declines gradually with time amount progress, leakage can be detected with the pressure information means 11. Also when leakage has occurred, inert gas leaks to a perimeter, and it is [no risk of ignition explosion] and is safe. Moreover, when the pressure of the fuel enclosed with a fuel cell is more than a predetermined pressure, after a pressure relief valve 13 will be in an open condition and charged pressure declines to a predetermined pressure, since a closedown is carried out

again, charged pressure can be set as a predetermined pressure, and breakage of a fuel cell can be prevented.

[0030] <u>Drawing 3</u> is the fuel cell generation-of-electrical-energy structure-of-a-system Fig. of the 3rd example of this invention, the thing of <u>drawing 1</u> and <u>drawing 2</u>, and a same sign is a corresponding component, and detailed explanation is omitted. In drawing, the fuel cell 7 is installed in the outdoors, valve mechanical-component 8a and valve mechanical-component 9a are attached in each of the point stop valve 8 and the former stop valve 9, and each valve mechanical component is connected with the valve-control section 14. The radio means 15 is connected with the timer means 16 and the cell section 17 for connecting with the pressure information means 11. Indoors the display means 18 and the storage means 19 of receiving the signal from the radio means 15 are established, and the time series display means 20 is connected to the storage means 19. 21 is an operation means which carries out data processing of the time series data of the storage means 19, 22 is a judgment means to judge the result of the operation means 21, and 23 is an information means to report based on the result of the judgment means 22. The information means 23 is connected to the service firm 26 through the public line 25 through the terminal circuit means 24.

[0031] In the above-mentioned configuration, before the point stop valve 8 and the former stop valve 9 perform the switching action of a valve and start a generating mode by the control signal machine ****** mechanical components 8a and 9a from the valve-control section 14, fuel gas is enclosed with the fuel path 10. The detection output obtained with the pressure information means 11 is indoors transmitted by the radio means 15 with the predetermined time interval set up with the timer means 16, and power required for a communication link is supplied from the cell section 17. Therefore, when leakage occurs in a fuel cell 7, the detection pressure force declines, it is transmitted from the radio means 15 and the pressure information according to a leak rate can detect leakage generating daily in the distant locations, such as indoor. Moreover, since the timer means 16 is operated with a predetermined time interval and it transmits from the radio means 15, when can hold down the power consumed in the case of transmission to necessary minimum, the cell section 17 is made to prolonged exchange needlessness, a part of generation-of-electrical-energy output of a fuel cell 7 is made to store electricity and it considers as the power source for a communication link, the amount of generations of electrical energy which can be used can be made to increase, the detection output transmitted indoors -- each time -- the display means 18 -- a digital readout -- since it is carried out, before an indoor user starts operation of a fuel cell 7, leakage of the fuel from a fuel cell 7 can be recognized. Moreover, since the charged pressure value acquired before a start up is accumulated in the storage means 19 as time series data, also when leakage advances gradually according to superannuation of a fuel cell 7, the situation of secular change of leakage can be detected exactly. Moreover, since the digital readout of the detection output for every day is carried out to the time series display means 20, an indoor user can recognize and judge the situation of secular change of leakage before initiation of a generating mode. Moreover, since data processing of the time series data accumulated in the storage means 19 is carried out with the operation means 21, the result is judged with the judgment means 22 and it is reported by the information means 23 based on a judgment result, an indoor user can be made to recognize a leakage situation objective excluding the individual decision difference by the user. Moreover, since it connects with the external service firm 26 through the public line 25, the terminal circuit means 24 connected to the information means 23 can provide the service firm 26 with the leakage information from the information means 23 timely, and even if a user is not conscious, it can carry out maintenance check of a fuel cell 7 effectively.

[0032]

[Effect of the Invention] It has the effectiveness which the fuel cell generation-of-electrical-energy system of this invention describes below explained above.

[0033] That is, if the closedown of the former stop valve is carried out after the closedown of the point stop valve arranged in the downstream of a fuel cell has been carried out by the 1st configuration equipped with a pressure information means detect and report the charged pressure in the condition that a former stop valve and a point stop valve, and both valves closed and a fuel is supplied from a fuel

path, it will be in the condition that the fuel was enclosed in the fuel cell, and the pressure value detects and will be reported by the pressure information means. Since a pressure value falls gradually when the fuel is revealed from the fuel cell, by the easy configuration which consists of two shut-off valves and pressure information means, leakage can be checked and a system can be miniaturized. Since leakage is detectable before starting a generating mode, it is safe, and since only the fuel within a fuel path is emitted even if leakage occurs, it is very little and safe.

[0034] Moreover, inert gas is enclosed in a fuel cell, and the pressure value is detected with a pressure information means by the 2nd configuration which equipped the entrance side of a former stop valve with the inert gas source of supply which supplies inert gas, and can detect leakage from a pressure drop by it. Also when leakage has occurred, inert gas is revealed to a perimeter, and it is [no risk of ignition explosion] and is safe.

[0035] Moreover, by the 3rd configuration equipped with the pressure relief valve wide opened by the predetermined pressure as a point stop valve, since a point stop valve will be in an open condition when the pressure of the fuel enclosed with a fuel cell is more than a predetermined pressure, also when charged pressure can be set as a predetermined pressure and charged pressure becomes high pressure unusually, high pressure does not arise in a fuel cell and breakage can be prevented.

[0036] Moreover, when the pressure of the fuel enclosed with a fuel cell is detected with a pressure information means by the 4th configuration equipped with a radio means to transmit the pressure information acquired with the pressure information means and leakage occurs in a fuel cell by it, the detection pressure force declines, and the pressure information according to a leak rate is transmitted from a radio means. Therefore, leakage generating can be daily checked without construction of a signal line etc. in the distant locations, such as indoor.

[0037] Moreover, when the power consumed in case it transmits from a radio means can be held down to necessary minimum, the generation-of-electrical-energy output of a fuel cell is stored electricity by the 5th configuration equipped with a timer means to operate a radio means with a predetermined time interval and it uses, the available amount of generations of electrical energy can be made to increase. [0038] since the pressure information on the fuel enclosed with the fuel cell by the 6th configuration equipped with a display means display indoors the pressure information transmitted by the radio means is indoors displayed by the radio means, before [moreover,] an indoor user starts operation of a fuel cell -- each time -- the fuel from a fuel cell -- leakage can be recognized and safety can improve so more to leakage.

[0039] moreover, the case where leakage advances gradually according to superannuation of a fuel cell by the 7th configuration equipped with a storage means to accumulate the time series data of the pressure information transmitted by the radio means -- before a start up -- each time -- detecting -- having -- charged pressure -- since pressure information is accumulated in a storage means, the situation of secular change of leakage is exactly detectable.

[0040] Moreover, by the 8th configuration equipped with a time series display means to display the time series data of the pressure information accumulated in the storage means, an indoor user can recognize and judge the situation of secular change of the leakage from a fuel cell before initiation of a generating mode.

[0041] By moreover, the 9th configuration in which the operation means and the judgment means of judging the abnormalities in leakage of a fuel from the pressure value acquired by carrying out data processing of the time series data of pressure information, and notifying the condition based on the result at the time of the need, and the information means were really constituted, and were installed indoors Also when extent of the pressure drop of an enclosure fuel advances gradually according to poor assembly, superannuation, etc. of a fuel cell The pressure information on the charged pressure detected before a start up is accumulated in a storage means as capital degree hour sequence data. Since a future present or leakage value is computed by the operation means, a comparison test is carried out to a reference value by the judgment means and an information means can report a leakage situation to an indoor user based on the result, a leakage situation can be made to recognize objective excluding individual difference.

[0042] Moreover, it can have the terminal circuit means connected to the external public line, and leakage information can be transmitted to the service firm of the exterior where the information means was connected with the terminal circuit means through the public line by the 10th configuration connected with said terminal circuit means etc. timely, and even if a user is not conscious, a service firm can carry out maintenance check of a fuel cell effectively.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The fuel cell generation-of-electrical-energy structure-of-a-system Fig. in the 1st example of this invention

[Drawing 2] The fuel cell generation-of-electrical-energy structure-of-a-system Fig. in the 2nd example of this invention

[Drawing 3] The fuel cell generation-of-electrical-energy structure-of-a-system Fig. in the 3rd example of this invention

[Drawing 4] The block diagram of the gas leak detecter from the conventional fuel cell

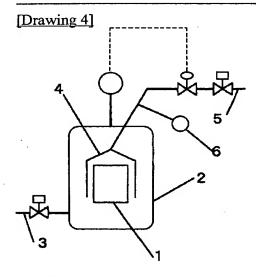
[Description of Notations]

- 7 Fuel Cell
- 8 Point Stop Valve
- 9 Former Stop Valve
- 11 Pressure Information Means

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DRAWINGS



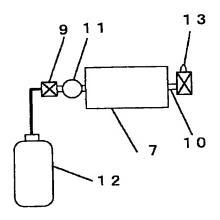
[Drawing 1]

7 燃料電池 8 先止め弁 9 元止め弁 11圧力報知手段

9 7 8

[Drawing 2]

12不活性ガス 供給源 13圧力逃がし弁



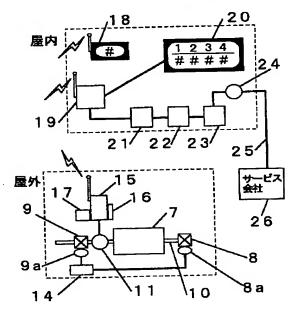
[Drawing 3]

15無線通信手段 21演算手段

16タイマー手段 22判定手段 23報知手段 18表示手段

19記憶手段

20時系列表示手段 24ターミナル回線手段



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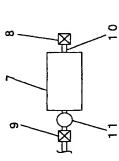
(54) 【発明の名称】燃料電池発電システム

[目的] 燃料電池の燃料漏洩検知による安全性の向 (57) [要約]

【構成】 燃料電池7の上流部と下流部に各々元止め弁 9と先止め弁8を設け、発電辺転開始前に燃料ガスを封 入し、その圧力変化を圧力報知手段!」で検知し、漏洩 の発生を封入圧力の低下から検知する。

经复额法 先止め弁

压力報知手段



られた元止め弁と、前記燃料電池の下流部に設けられた 先止め弁と、前記両弁が閉じた状態での压力を検知し報 【請求項2】 元止め弁の入口側に不活性ガスを供給する 不活性ガス供給潤を備えた精水頂」記載の燃料低池発電 【請求項1】燃料電池と、前記燃料電池の上流部に設け 知する圧力報知手段とを備えた燃料電池発電システム。

【静求項3】先止め弁として所定圧力で開放される圧力 進かし弁を備えた請求項!記載の燃料電池発電システ システム。

る無線通倡手段を備えた請求項!記載の燃料電池発電シ 【請求項4】圧力報知手段で得られた圧力情報を送信す

【諸求項5】無線通信手段を所定の時間間隔で動作させ るタイマー手段を備えた請求項4記載の燃料電池発電シ

[0000]

【請求項6】無線通信手段によって送信された圧力情報 を屋内に投示する表示手段を備えた請求項 4 記載の燃料

の時系列データを習慣する記憶手段を備えた辦求項4記 【請求項7】 無線通信手段によって送信された圧力佾報 裁の燃料電池発電システム。 塩池発電システム。

【請求項8】記憶手段に蓄積された圧力情報の時系列デ 一タを表示する時系列表示手段を備えた翻求項7記載の 燃料電池発電システム。

【耕水頃9】 記憶手段に密視された圧力情報の時系列デ 判定手段と、前配判定手段の結果に基づき、必要時にそ 段と前記判定手段と前記報知手段が一体構成されて屋内 ータを演算処理する演算手段と、前記演算手段で得られ た圧力値及び装準値に基づき燃料の漏洩異常を判定する の状態を表示、通報する報知手段とを備え、前記演算手 【請求項10】外部の公衆回線に接続されたターミナル 回線手段を備え、報知手段が前記ターミナル回線手段と に設置された精水頂7記載の燃料電池発電システム。 接続された請求項 9 記載の燃料電池発電システム。

【発明の詳細な説明】

洩を運転開始以前に検知し、安全性の向上を図った燃料 【産業上の利用分野】本発明は燃料塩池からの燃料の溺 [1000]

昭池発電システムに関するものである。

れている。 燃料低池本体1の内部から容器2内に強夷し 図4に示す特開平4-220955号公報の構成のもの があった。図に示すように、燃料電池本体 1 は容器 2 に 収納され、3は容器2内に一端から窒素ガスなどのイナ 【従来の技術】従来、この種の燃料電池として、例えば **ートガスを供給するイナートガス供給ライン、4 は燃料 電池本体 | を包囲する環いであり上部はイナートガス放** 出ライン5に進通接続され、ガス濃度検知器6が設けら

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た水素などの燃料ガスは覆い4で補集され、ガス濃度検 田路 6 で検知されるようになっていた。

【発明が解決しようとする原題】しかしなから上記従来 の構成では、燃料電池本体 1 を包囲する容器 2、及び窒 **栽などのイナートガスを常に充満させるための装置が必** 要でありシステム全体が小型化でぎず、またガス鐵度検 知了の不良または検知特度以下のガス湖れが発生した場 合には可燃性のガスが容器2内に充満し、非常に危険な 状態に至るという瞑題があった。 2

で、発虹運転を開始する耶前に、しかも日常的に燃料の 満洩を監視できる小型で信頼性の高い燃料電池発電シス [0004] 本発明は上記従来の盟盟を解決するもの テムを提供することを目的とする。

と、前記燃料電池の上流部に設けられた元止め弁と、前 【姒盟を解決するための手段】本発明は上記姒題を解決 記燃料塩池の下流部に設けられた先止め弁と、前記両弁 か切じた状態での圧力を検知し報知する圧力報知手段と するために以下の構成より成る。すなわち、燃料電池

【0006】また第2の構成としては、元止め弁の入口 例に不活性ガスを供給する不活性ガス供給源を備えた構 を備えた構成としている。 成としている

所定圧力で間放される圧力逃がし弁を備えた構成として 【0007】また第3の構成としては、先止め弁として

【0008】また第4の構成としては、圧力報知手段で 得られた圧力情報を送信する無線適倡手段を備えた構成 としている。 5.5

【0009】また第5の構成としては、無線通信手段を 所定の時間間隔で動作させるタイマー手段を備えた構成 としている。

【0010】また第6の構成としては、無線通信手段に よって送信された圧力情報を屋内に表示する表示手段を 備えた構成としている。

【0011】また第7の構成としては、無線通倡手段に よって送信された圧力情報の時系列アータを密視する記 **健手段を備えた構成としている。**

【0012】また第8の構成としては、配볕手段に密報 された圧力情報の時系列データを表示する時系列表示手 9

結果に基づき、必要時にその状態を表示、通報する報知 手段とを備え、前記演算手段と前記判定手段と前記報知 【0013】また第9の構成としては、記憶手段に密模 された圧力情報の時系列データを消算処理する演算手段 燃料の湿泡異常を判定する判定手段と、前記判定手段の と、前紀演算手段で得られた圧力値及び基準値に基づき 手段が一体構成されて屋内に設置された構成としてい 段を備えた構成としている。

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[0014] また第10の構成としては、外部の公衆回 **線に接続されたターミナル回線手段を備え、報知手段が** 前記ターミナル回殺手段と接続された構成としている。 [0 0 1 5]

は以下の作用を果たす。すなわち、元止め弁及び先止め **取けられた先止め弁が閉止された状態で燃料が供給され** た後、燃料電池の上流部に設けられた元止め弁が閉止さ ともに徐々に低下するので圧力報知手段によって漏洩を 弁と、両弁が閉じた状態での封入圧力を検知し報知する 圧力報知手段を備えた構成により、燃料電池の下流部に れると、燃料電池内に燃料が封入された状態となり、そ の封入圧力値が圧力報知手段によって報知される。燃料 取池から燃料が漏洩している際には圧力値が時間経過と 【作用】上記構成により本発明の燃料電池発電システム

検知され圧力低下から認洩が確認できる。もし溺洩が発 活性ガスを供給する不活性ガス供給潮を備えた構成によ 【0016】また第2の構成の、元止め弁の入口側に不 り、元止め弁を経て燃料電池内に不活性ガスが封入され た状態となり、その封入圧力値が圧力報知手段によって 生している際にも周囲へ溺れるのが不活性ガスであり引 火爆発の危険がなく安全である。

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【0017】また第3の構成の、先止め弁として所定圧 力で開放される圧力逃がし弁を備えた構成により、燃料 電池へ封入される燃料の圧力が所定圧力以上である場合 には、先止め弁が開放状態となり所定圧力まで封入圧力 が低下した後、閉止されるので封入圧力を所定圧力に設 定することができ、燃料電池の破損を防止できる。

【0018】また第4の構成の、圧力報知手段で得られ り、燃料電池に封入された燃料の圧力変化が圧力報知手 段で検知され、燃料電池に漏洩が発生した際には検出圧 力が低下し、編洩量に応じた圧力悄報が無線通信手段か ら送信される。従って屋内などの離れた場所で日常的に た圧力情報を送信する無線通信手段を備えた構成によ 福洩発生を確認できる。 【0019】また第5の構成の、無線通信手段を所定の り、無線通信手段から送信する際に消費される電力を必 時間即隔で動作させるタイマー手段を備えた構成によ 既战小段に抑えることができる。

【0020】また第6の構成の、無線通信手段によって 送倡された圧力情報を屋内に表示する表示手段を備えた 構成により、燃料電池に封入された燃料の圧力情報が無 緑道信手段によって屋内に表示されるので、屋内の利用 者が燃料電池の道転を開始する前に、燃料電池からの燃 料の漏洩を認識することができる。

【0021】また第7の構成の、無線通信手段によって 送信された圧力情報の時系列データを踏視する記憶手段 を備えた構成により、燃料知池の老朽化によって顕改が 圧力の圧力情報が都度記憶手段に蓄積されるので、福洩 徐々に進行する場合にも、運転開始前に検知される封入

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の程年変化の状況を検知できる。

圧力情報の時系列アータを表示する時系列表示手段を備 燃料電池からの漏洩の経年変化の状況を認識することが 【0022】また第8の構成の、記憶手段に蓄積された えた構成により、屋内の利用者が発電運転の関始前に、

て記憶手段に蓄視され、演算手段によって現在あるいは 将来の漏洩値が算出され、判定手段によって基準値と比 圧力情報の時系列データを演算処理する演算手段と、前 記済菓手段で得られた圧力値及び基準値に基づき燃料の **溺洩異常を判定する判定手段と、前記判定手段の結果に** 基づき、必要時にその状態を表示、通報する報知手段と を備え、前記演算手段と前記判定手段と前記報知手段が -体構成されて屋内に設置された構成により、燃料電池 の組立不良や老朽化などによって運転開始前の封入圧力 の低下傾向がが徐々に進行する場合にも、巡転開始前に 即度検知される封入圧力の圧力情報が時系列データとし 敗判定され、その結果に基づいて報知手段によって屋内 【0023】また第9の構成の、配位手段に密積された の利用者に漏洩状況を認識させることができる。

【0024】また第10の構成の、外部の公衆回線に接 焼されたターミナル回線手段を備え、報知手段が前記タ **一ミナル回線手段と接続された構成により、ターミナル** 回線手段と公衆回線を介して接続された外部のサービス 会社などに、弱洩情報を適時伝達することができる。 |異旋例|| 以下本発明の実施例を図面を参照して説明す

の下流部に投けられた先止め弁8及び上流部部に扱けら り、燃料経路10には圧力報知手段11が設けられてい 【0026】図1は本発明の第1の実施例の燃料電池発 低システムの構成図である。図1において、燃料電池7 れた元止め弁9は、燃料経路10で運通接続されてお

燃料ガスが充満する。その後元止め弁9を閉じると、燃 される。燃料低池7から燃料ガスが漏洩していない場合 となり、その封入圧力が圧力報知手段11によって検知 【0027】上記構成において、先止め弁8を閉じ元止 料ガスが供給されると、燃料電池7及び燃料経路10に 料電池7及び燃料経路10に燃料ガスが封入された状態 には、封入圧力は一定値を維持するが、燃料ガスが漏洩 している場合には、封入圧力が時間経過とともに徐々に 低下するので圧力報知手段11によって鷸洩を確認でき め弁9を聞いた状態で、燃料供給源(図示せず)から燃

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供給顔であり、圧力选がし弁!3は燃料経路!0の下流 【0028】図2は本発明の第2の実施例の燃料電池発 瓜システムの構成図であり、図1と同符号のものは相当 て、12は元止め弁9の入口側に接続された不活性ガス する構成要素であり詳細な説明は省略する。図におい

から不活性ガスが供給されると、燃料電池1及び燃料経 スが封入された状態となり、その封入圧力が圧力報知手 **漏洩が発生している際にも周囲へ漏れるのが不活性ガス** であり引火爆発の危険がなく安全である。また、燃料電 池へ封入される燃料の圧力が所定圧力以上である場合に は、圧力逃がし弁13が開放状態となり所定圧力まで封 段11によって検知される。不活性ガスが漏洩している 場合には、封入圧力が時間経過とともに徐々に低下する ので圧力報知手段11によって漏洩を検知できる。もし 入圧力が低下した後、再度閉止されるので封入圧力を所 定圧力に設定することができ、燃料電池の破損を防止で 【0029】上記構成において、不活性ガス供給潮12 路10に不活性ガスが充満する。その後圧力逃がし弁1 3を閉じると、燃料電池7及び燃料経路10に不活性ガ

7と接続されている。屋内には無線通倡手段15からの 処理する演算手段であり、22は演算手段21の結果を 判定する判定手段であり、23は判定手段22の結果に 基づいて報知する報知手段である。報知手段23はター ミナル回線手段24を介し、公衆回線25を経てサービ **倡号を受信する表示手段|8及び記憶手段|9が設けら** れており、記憶手段19には時系列表示手段20か接続 されている。21は記憶手段19の時系列データを演算 低システムの構成図であり、図1及び図2と同符号のも のは相当する構成要素であり詳細な説明は省略する。図 先止め弁8と元止め弁9の各々には弁駆動部8a及び弁 駆動部98が取付けられており、各弁駆動部は弁制御部 | 4と接続されている。無線通信手段 | 5は圧力報知手 【0030】図3は本発明の第3の実施例の燃料電池発 において、燃料電池7は例えば屋外に設置されており、 段11と接続され、されにタイマー手段16、電池部1 ス会社26に接続されている。

する場合には、利用できる発電盘を増加させることがで a及びg aによって弁の間閉動作を行い、発電運転を開 始する前に燃料経路10に燃料ガスが封入される。圧力 報知手段11で得られる検知出力は、タイマー手段16 で設定された所定の時間間隔で無線通信手段 | 5 によっ て屋内に伝送され、通信に必要な電力は電池部17から 供給される。従って、燃料電池7に漏洩が発生した際に は検出圧力が低下し、腐洩型に応じた圧力情報が無線通 **信手段 | 5から送信され、屋内などの離れた場所で日常** 的に閻洩発生を検知できる。また、タイマー手段16を 所定の時間間隔で動作させて無線通信手段 1.5 から送信 するので、送信の際に消費される電力を必要費小限に抑 **然料電池 7 の発電出力の一部を密電させて通信用電缆と** 【0031】上記構成において、先止め弁8と元止め弁 9は、弁制御部14からの制御信号基づいて弁駆動部8 えることができ、低池部17を長期間交換不要にでき、

抜続されているので、頼知手段23からの刕洩情報をサ る。また、時系列表示手段20に例えば一日毎の検知出 2で判定され、判定結果に基づいて報知手段23で報知 されるので、利用者による個人判断是を含まず、客観的 1は、公衆回線25を介して外部のサービス会社26に 一ピス会社26に適時提供でき、利用者が意識しなくて 8に数値表示されるので、屋内の利用者が燃料電池7の **運転を開始する前に、燃料電池7からの燃料の漏洩を認 費することができる。また、運転開始前に得られる封入** 圧力値は記憶手段19に時系列データとして密視される ので、燃料電池1の老朽化によって溜洩が徐々に進行す 力が数値表示されるので、屋内の利用者が発電辺転の開 始前に、煽洩の程年変化の状況を認識し判断することが できる。また、記憶手段19に密損された時系列テータ は演算手段21で演算処理され、その結果は判定手段2 また、報知手段23に接続されたターミナル回線手段2 に屋内の利用者に漏洩状況を認識させることができる。 る場合にも、漏洩の経年変化の状況を的避に検知でき も燃料電池7の保守点検を効果的に実施できる。

【0033】すなわち、元止め弁及び先止め弁と、両弁 している際には圧力値が徐々に低下するので、2 つの閉 したとしても燃料経路内の燃料のみが放出されるのでご 段を個えた第1の構成により、燃料電池の下流部に配設 された先止め弁が閉止された状態で燃料経路から燃料が 段によって検知し報知される。 燃料電池から燃料が漏洩 止弁と圧力報知手段からなる簡単な構成によって溺洩を 確認できシステムを小型化できる。発電運転を開始する 前に脳洩を検知できるので安全であり、もし鄙洩が発生 【発明の効果】以上説明したように本発明の燃料電池発 が閉じた状態での封入圧力を検知し報知する圧力報知手 燃料が封入された状態となり、その圧力値が圧力報知手 供給されたのち元止め弁が閉止されると、燃料電池内に **電システムは、以下に述べる効果を有するものである。** く少型であり安全である。 [0 0 3 2]

もし漏洩が発生している際にも周囲へ濁洩されるのが不 【0034】また元止め弁の入口側に不沾性ガスを供給 する不活性ガス供給源を備えた第2の構成により、燃料 30位内に不活性ガスが封入され、その圧力値が圧力報知 手段によって検知され圧力低下から弱洩を検知できる。

【0035】また、先止め弁として所定圧力で関放され る圧力选がし弁を備えた第3の構成により、燃料電池へ 設定することができ、封入圧力が異常に高圧となった場 合にも燃料電池内に高圧が生じることがなく破損を防止 先止め弁が開放状態となるので、封入圧力を所定圧力に 封入される燃料の圧力が所定圧力以上である場合には、 活性ガスであり引火爆発の危険がなく安全である。

【0036】また圧力報知手段で得られた圧力情報を送 信する無線通信手段を備えた第4の構成により、燃料電

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きる。屋内に伝送された検知出力は、都度、表示手段1

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猫に設けられている。

燃料電池に漏洩が発生した際には検出圧力が低下し、溺 従って信号線などの施工なしに、屋内などの離れた場所 独盤に応じた圧力情報が無線通信手段から送信される。 心に封入される燃料の圧力が圧力報知手段で検知され、 で日常的に湿洩発生を確認できる。

2 **宮手段から送信する際に消費される電力を必要億小限に** て利用する場合には利用可能な発電量を増加させること 【0037】また無線通信手段を所定の時間間隔で動作 させるタイマー手段を備えた第5の構成により、無線通 仰えることができ、燃料電池の発電出力を密電しておい

段によって屋内に表示されるので、屋内の利用者が燃料 電池の運転を開始する前に都度燃料電池からの燃料の漏 【0038】また無線通信手段によって送信された圧力 **情報を屋内に表示する表示手段を備えた第6の構成によ** り、燃料電池に封入された燃料の圧力情報が無線通信手 洩を認識することができ、溺洩にたいしてより安全性が 向上できる。

悄報の時系列データを監視する記憶手段を備えた第7の 構成により、燃料電池の老朽化によって漏洩が徐々に進 行する場合にも、運転開始前に都度検知される封入圧力 の圧力情報が記憶手段に密視されるので、漏洩の経年変 【0039】また無線通信手段によって送信された圧力 化の状況を的確に検知できる。

【0040】また記憶手段に蓄積された圧力情報の時系 列データを表示する時系列表示手段を備えた第8の構成 により、屋内の利用者が発電道転の開始前に、燃料電池 からの溜洩の経年変化の状況を認識し判断することがで

ജ 【0041】また圧力情報の時系列データを演算処理し て得られた圧力値から燃料の漏洩異常を判定しその結果 に基づき必要時にその状態を通報する、演算手段と判定 (区 区

て基準値と比較判定され、その結果に基づいて報知手段 によって屋内の利用者に漏洩状況を報知できるので、漏 型転開始前に検知される封入圧力の圧力情報が都度時系 現在あるいは将来の漏洩値が算出され、判定手段によっ **洩状況を個人差を含まず客観的に認識させることができ** 手段と報知手段が一体構成されて屋内に設置された第9 開成により、燃料電池の組立不良や老朽化などによって 列データとして記位手段に蓄積され、演算手段によって 封入燃料の圧力低下の程度が徐々に進行する場合にも、

【0042】また外部の公衆回線に接続されたターミナ ル回線手段を備え、粗知手段が前記ターミナル回線手段 と接続された第10の構成により、ターミナル回線手段 に、漏洩情報を適時伝達することができ、利用者が意識 しなくてもサービス会社が燃料電池の保守点検を物界的 と公衆回線を介して接続された外部のサービス会社など に実施できる。

【図面の簡単な説明】

【図1】本発明の第1の実施例における燃料電池発電シ 8

【図2】本発明の第2の実施例における燃料電池発電シ ステムの構成図

【図3】本発明の第3の実施例における燃料電池発電シ ステムの構成図

【図4】 従来の燃料電池からのガス溺洩検知装置の構成 ステムの構成図

【符号の説明】

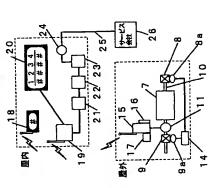
医性性

先止め弁

1.1 压力報知手段 9 元止め**弁**

[図3]

20時系列表示手段24ターミナル回線手段 - 5 無機通信手段 6タイマー手段 9 配信中级



[図]

[図2]

13圧力強がし井 12 不活性ガス 供給類

9

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